

## **Peace Project Water Use Plan**

### **Williston Recreation Use**

**Reference: GSMON-20**

**BC Hydro Williston Reservoir Recreation Use Monitoring  
Program, Data Report Year 7 (2015)**

**Study Period: May – October 2015**

**Synergy Applied Ecology**

# BC HYDRO WILLISTON RESERVOIR RECREATION USE MONITORING PROGRAM, DATA REPORT YEAR 7 (2015)

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## ABSTRACT

BC Hydro has committed to improving existing facilities constructing new boat launches at recreation sites accessing the Williston Reservoir as part of Peace Water Use Plans. A 10-year reservoir recreation use monitoring program was initiated in 2009 to assess use of boat launch sites before and after improvements. Vehicle counters and remote cameras were used concurrently to evaluate 2 primary management objectives. Does recreational use of Williston Reservoir boat launches increase after boat access is improved? What is the frequency of use of newly constructed boat launches? This is a data summary report presenting the results of Year 7 (2015) use monitoring at 6 recreation sites. Sites include, Cut Thumb Bay (38 Mile), Six Mile Bay, Finlay Bay (76 Mile) and Alexander Mackenzie Landing (22 Mile) in the Parsnip Reach. Elizabeth Creek and Dunlevy are located in the Peace Reach. Dunlevy had extensive reconstruction of the boat ramp structure completed in May of 2015. Total Year 7 (2015) recreation site use estimated from photo-corrected counter data ranged from 279 discrete visits at Finlay Bay to 1583 visits at Cut Thumb Bay between May 14 and October 31, 2015. Estimated boater visits ranged from 123 at Six Mile Bay to 428 at Dunlevy.



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**Citation:** Cubberley, J.C. and P.E. Hengeveld. 2016. BC Hydro Williston Reservoir Recreation Use Monitoring Program, Data Report Year 7 (2015). Synergy Applied Ecology, Mackenzie, BC. 14 pp plus appendix.

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**Date:** May 2016

**Reference:** Peace River Water Use Plan; BC Hydro Project Q8-8964 Williston Reservoir Recreation Use; BC Hydro GMSMON 20; BC Hydro CO 82471; SAE SPN39.

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## INTRODUCTION

Boat launch facilities along the Williston Reservoir are to be improved as part of the Access, Navigation, and Safety Management Plan within the Peace Water Use Plan (WUP). Design and construction of boat launches is intended to facilitate increased boater access to the reservoir at all water elevations. BC Hydro project GSMON-20 is a 10-year site use monitoring program implemented to evaluate seasonal use of 6 boat launches before and after improvements and allocate future efforts relative to this objective appropriately (BC Hydro 2008). To date, 2 boat ramps have been reconstructed, 2 recreation sites have been expanded to increase camp site capacity, while 2 sites will not be altered and act as controls for statistical analysis. Results of the monitoring program are expected to address 2 primary management questions:

- Does recreational use of the Williston Reservoir boat launches increase after boat access is improved?
- What is the timing and frequency of use of newly constructed boat launches? Specifically, does seasonal use change with improved access to new areas of the reservoir, and improved access during low reservoir levels?

This report provides a summary of project activities and accomplishments in Year 7 (2015). Recreation site photos can be found in Appendix A. A review of data collected between Year 1 (2009) - Year 5 (Cubberley and Hengeveld 2014) and projected analysis summary are available at:

[http://www.bchydro.com/content/BCHydro/en/toolbar/about/sustainability/conservation/water\\_use\\_planning/northern\\_interior/peace\\_river/williston\\_reservoir.html/](http://www.bchydro.com/content/BCHydro/en/toolbar/about/sustainability/conservation/water_use_planning/northern_interior/peace_river/williston_reservoir.html/)

## METHODS

### Study Area

#### *Williston Reservoir*

The Williston Reservoir is the largest man-made, hydroelectric reservoir in British Columbia with a surface area of 1,779 km<sup>2</sup> and a shoreline perimeter of 1,700 km (Figure 1). The reservoir offers considerable recreational, fishing, hunting and wildlife viewing opportunities as boaters can access remote, undeveloped areas of the watershed with relative ease. The maximum licensed water elevation is 672 masl and a minimum elevation of 640 masl, with the lowest water elevation typically reached in April annually.



Figure 1. The Williston Reservoir and surrounding watershed boundary in northern British Columbia. The W.A.C. Bennett and Peace Canyon hydroelectric dams are located on the Peace River adjacent to the community of Hudson's Hope.

Six recreation sites that offer boater access to the Williston Reservoir are included in the monitoring program (BC Hydro 2008). Two of these sites, Elizabeth Creek and Dunlevy, are in the Peace Reach while the other four sites, Finlay Bay (76 Mile), Six Mile Bay, Cut Thumb Bay (38 Mile), and Alexander Mackenzie Landing (22 Mile) are in the Parsnip Reach (Figure 2). Boat launch condition and amenities vary among sites.

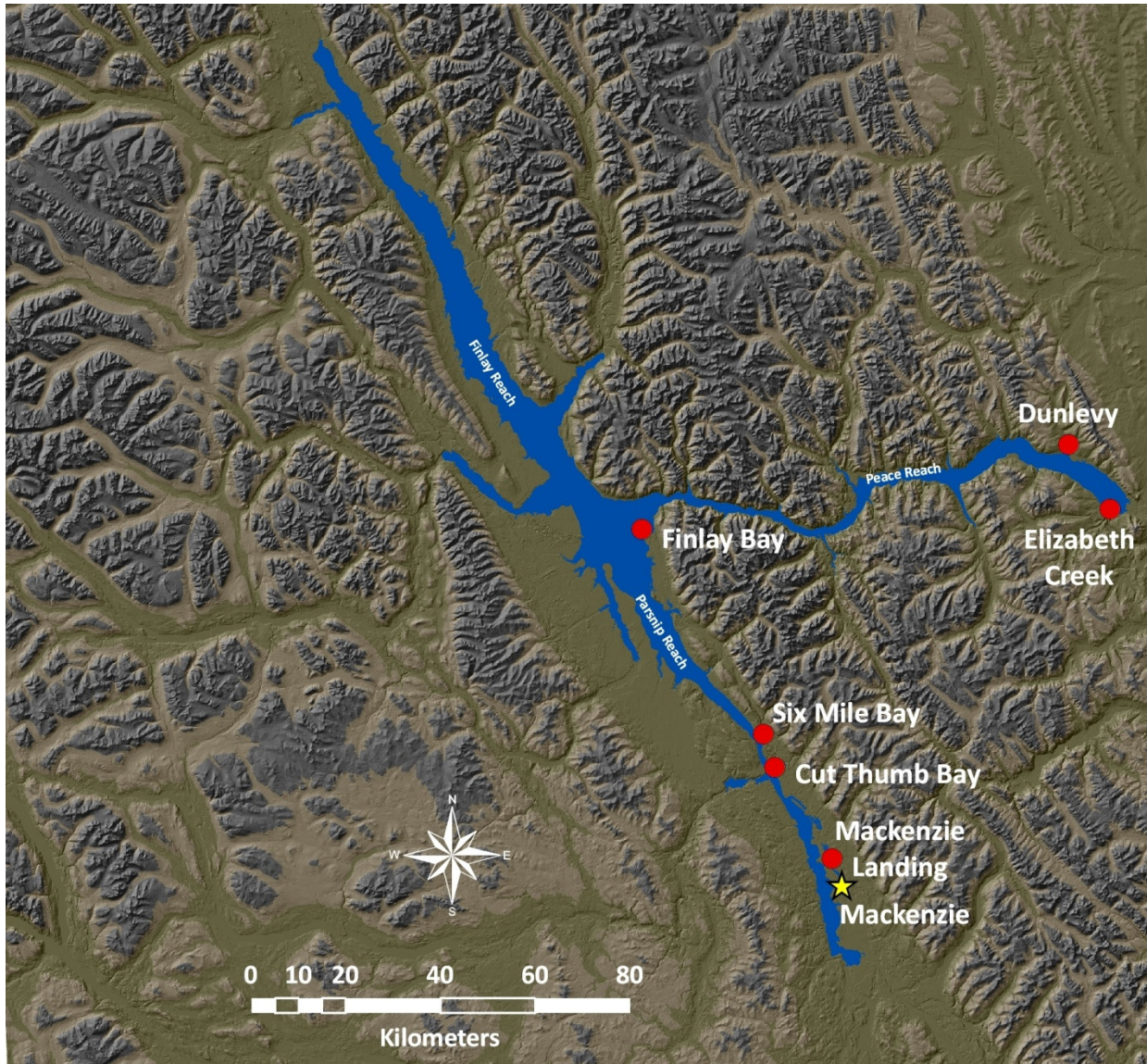


Figure 2. Williston Reservoir recreation sites monitored in Year 7 (2015).

### ***Recreation Site Descriptions***

Cut Thumb Bay recreation site is located approximately 35-40 minutes driving time from Mackenzie. Access is via the Parsnip West Forest Service Road (FSR), a well-maintained, radio-assisted gravel mainline, turning west between the 33 and 34 km markers onto a 4 km long gravel spur road. The site consists of 15 camp stalls with picnic tables and 4 outhouses. During low reservoir elevation there is a large gravel bar where users can park, camp, and launch boats (Appendix A). The narrow road that leads to the gravel bar becomes the boat launch at highest water elevation. The reservoir water elevation dictates how much room users have to launch boats and camp at this site. When reservoir elevation is low there is more room for parking and camping but decreases as water elevation increases.

Six Mile Bay recreation site is located approximately 45-50 minutes driving time from Mackenzie. Access is via the Parsnip West FSR, turning west at the 41 km marker onto an approximately 1 km long, dirt access road. The site consists of 17 camp stalls with picnic tables, 3 outhouses, and boat trailer parking. At low reservoir elevation, an open, gravel area provides additional parking or camping space. Access to this gravel bar is via the dirt road that also serves as the boat launch. At elevations lower than 667 masl, it may be difficult to launch larger boats as there is a steep drop off to the water and the sandy substrate may cause vehicles to become stuck (Appendix A).

Finlay Bay recreation site is located approximately 1.5-2 hours driving time from Mackenzie. Access is via the Parsnip West FSR. At the 96 km marker, the Parsnip terminates and there is a turn off onto a 1 km long, narrow (approx. 4 m wide) gravel road leading to the recreation site. The site consists of 11 camp stalls with picnic tables and 3 outhouses. There is also a large open field area where many users prefer to camp and where boat trailers are parked. The boat launch is a short gravel road that is approximately 4 m wide (Appendix A). There are remnants of old slabs of concrete and pieces of rebar laying off to the side, indicating that a concrete launch once existed. At low reservoir elevation, vehicles must drive over rocks and sand to reach the water. Finlay Bay will not be improved and is a designated control site for the monitoring program.

Elizabeth Creek recreation site is located approximately 20 minutes driving time from Hudson's Hope. Access is via paved Highway 29, turning right (north) approximately 300 m after crossing the crest of the WAC Bennett Dam. The site is intended for day-use, as there are no defined camp stalls, but overnight parking is common. There are two outhouses on site and a gravel parking lot with area for vehicles with boat trailers. The boat launch is approximately 6 m wide, constructed of concrete and in good condition (Appendix A). The boat launch has been constructed to allow all sizes of boats to access the reservoir at both low and high water elevation. Elizabeth Creek will not be improved and is a designated control site for the monitoring program.



Dunlevy recreation site is located approximately 40 minutes driving time from Hudson's Hope. Access is via Highway 29, turning north on 12 Mile Road and following this well-maintained gravel road for 26 kms to the site. The boat launch is a 6 m wide concrete ramp and provides reservoir access at 660.5 masl. There is a large open area for parking and 2 outhouses. Although the site is intended as a day use site, there is evidence that the site is used for overnight camping. This site is part of Butler Ridge Provincial Park (Appendix A).

Alexander Mackenzie Landing recreation site is located approximately 10 minutes driving time from Mackenzie. Access is via the Parsnip West FSR for approximately 7 km with several signs that lead users to the site from Highway 39. The site is well-maintained and designated for day use with a picnic area, cooking shelter and amphitheater. There is parking with 2 outhouses on site. Immediately adjacent to the day use site is the BC Hydro Alexander Mackenzie Landing campsite which contains 10 camp stalls suitable for all RVs. A foot path joins the two sites. The primary boat launch is approximately 6 m wide, constructed of concrete and in good condition (Appendix A). Users launch directly from the concrete slab at elevation 662 masl or above, but must travel further down foreshore area on a newly constructed, gravel road to access the reservoir using a secondary low elevation concrete boat ramp that extends to 658 masl. As the reservoir elevation increases the low elevation launch is submerged. Buoys mark the underwater road to boaters.

### ***Recreation Site Improvement Summary***

Six Mile Bay and Dunlevy recreation sites were improved in Year 7 (2015). Seventeen new camping stalls were cleared at Six Mile Bay in August 2015 by the District of Mackenzie, McLeod Lake Indian Band, and Recreation Sites and Trails Branch Forests, Lands and Natural Resource Operations. An open, gravel area adjacent to the boat launch now provides additional boat trailer or day parking space. No improvements were made to the boat launch and launching when reservoir elevation is less than 667 masl is still difficult

The boat ramp structure at Dunlevy was reconstructed with concrete to finish off the improvements to the parking lot and approach in 2014. The ramp grade was reduced and the ramp is now approximately 6 m wide with room for visitors with boat trailers to turn around at the top of the launch. The toe of the ramp reaches to 660.5 masl. The site was opened to the public on May 15 2015 (Appendix A).

Over the course of the GSMON-20 monitoring program, several events such as site closures have influenced recreation site use. Table 1 provides a summary of events to consider for final data analysis from Year 1 (2009) - Year 6 (2014). Events will be added to the table as necessary.

Table 1. Summary table of events to consider from 2009 - 2015 for GSMON-20 final analyses.

Event	Site	Date
Year 1 (2009)		
Closed by BC Parks (website notice)	Dunlevy	May 14-October 31
Community fishing derby	Cut Thumb	August 29-30
Year 2 (2010)		
Lowest reservoir level in 10 years	All sites	May 14-October 31
Closed by BC Parks (website notice)	Dunlevy	May 14-October 31
Community fishing derby	Cut Thumb	August 28-29
Year 3 (2011)		
Monitoring discontinued <sup>1</sup>	Strandberg	
Added to monitoring program	Mackenzie Landing	May 14-October 31
Community fishing derby	Cut Thumb	August 27-28
GMS spillway scaling Yr1 (pilot car)	Elizabeth Creek	May -October 31
Closed due to construction	Mackenzie Landing	July 12-22
Mackenzie community event	Mackenzie Landing	June 10
Family Fishing Weekend Derby	Mackenzie Landing	June 18-19
Year 4 (2012)		
Closed due to spilling	Elizabeth Creek	June 26-August 3
Mackenzie community event	Mackenzie Landing	June 8-9
Mackenzie community event	Mackenzie Landing	June 10
Family Fishing Weekend Derby	Mackenzie Landing	June 16-17
Community fishing derby	Cut Thumb	August 18-19
GMS spillway scaling Yr2 (no pilot)	Elizabeth Creek	May 14-October 31
Year 5 (2013)		
Site capacity increased	Cut Thumb	July 4-31
Community fishing derby	Cut Thumb	August 24-25
Family Fishing Weekend Derby	Mackenzie Landing	June 15-16
Year 6 (2014)		
Closed due to wildfire	Elizabeth Creek	July 16 - 18
Community fishing derby	Cut Thumb	August 23-24
Closed due to construction	Dunlevy	May 14-October 31
Closed due to construction	Mackenzie Landing	May 14-20

Year 7 (2015)

Community fishing derby

Cut Thumb

August 22-23

Site capacity increased

Six Mile

July 15-August 20

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<sup>1</sup> Monitoring discontinued at Strandberg due to low use (Cubberley and Hengeveld 2011) .

## Data Collection and Analysis

Recreation site use monitoring was accomplished using remote vehicle counters and motion-sensitive digital cameras synchronized by date and time. Counters provide primary data, while camera data adds redundancy and improved confidence in monitoring trends by identifying 'false' events such as maintenance vehicles and ATVs. Site use is based on discrete vehicle visits where repeat users are given a unique identification number for each visit regardless of how many times they visit the site. The combination of counter and camera data allows for estimates of the following:

- The number of recreation site users with boats
- The duration of site user visits with and without boats
- The number of repeat users at each site

We favoured placing the monitoring equipment along the access roads into each site in order to keep data capture consistent between sites, monitoring years and, after launch improvements. Due to differences in layout at Elizabeth Creek and Mackenzie Landing, sites designated for day use only, remote monitoring equipment was installed directly adjacent to the concrete boat launch. All data are compiled in a secure MS Access database. A detailed description of data collection methods and equipment settings can be found in Cubberley and Hengeveld (2012).

## RESULTS

### Recreation Site Use

Remote monitoring equipment operated continuously throughout the 171 day monitoring period. Over 53,000 photos were processed and a total of 18,042 new data were added to the site use database in Year 7 (2015). Of these records, 16,340 (91%) are photo-validated. Overall recreation site use ranged from 417 visits at Finlay Bay to 1583 visits at Cut Thumb (Table 2). Because of construction activity at Six Mile Bay, the number of site visits in July was reduced. However, once construction of new camping stalls was completed the total number of site users was the highest recorded since monitoring was initiated in 2009 (Figure 3).

Table 2. Total use by site estimated for monitoring Year 5 (2013), Year 6 (2014), and Year 7 (2015). Estimates include both boaters and non-boaters. Parentheses indicate lower and upper estimates among sites. Monitoring period: May 14 – October 31.

Site	2013	2014	2015
Cut Thumb Bay	639 (444-1827)	1840 (1484-2169)	1583 (1537 - 1733)
Six Mile Bay	415 (271-539)	480 (462-527)	519 (504 - 673)
Finlay Bay	420 (316-490)	399 (277-503)	417 (409 - 463)
Elizabeth Creek	638 (449-951)	715 (616-1276)	514 (455 - 929)
Dunlevy <sup>1</sup>	911 (580-1005)	--	1119 (1046 - 1144)
Mackenzie Landing	953 (788-1125)	1025 (932-1412)	706 (685-1270)
Total visits	3,976	4,459	4,858

<sup>1</sup>Dunlevy was closed for construction through Year 6 (2014) and not monitored

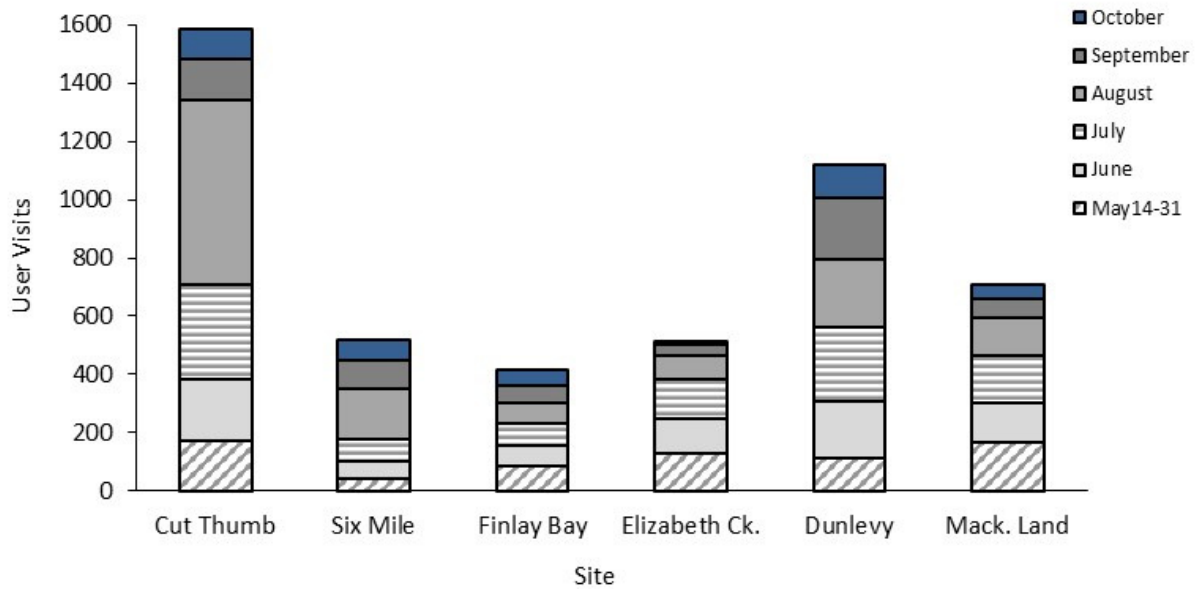


Figure 3. Estimated total monthly use by site in Year 7 (2015) between May 14 and October 31.

Of all sites, the highest number of boater visits were logged at Dunlevy in Year 7 (2015). Estimated boater visits ranged from 123 at Six Mile Bay to 428 at Dunlevy. Finlay Bay and Mackenzie Landing had increased photo-verified boater visits in Year 7 (2015) from the previous year (Table 3). At Dunlevy, photo-verified boater visits increased upon completion of ramp improvements, however the proportion of photo-verified boater visits increased only slightly as there was a commensurate increase in total site visits from counts prior to reconstruction (Figure 4). Numerous short duration non-boater visits to Dunlevy and early in the season, post-construction, indicated local interest in the improvements.

Table 3. Proportion (%) of photo-validated vehicles bringing boats to recreation sites during the Year 5 (2013), and Year 6 (2014) Year 7 (2015), monitoring periods. Parentheses indicate total number of photo-verified site users annually.

Site	2013	2014	2015
Cut Thumb Bay	45.7 (444)	26.8 (1484)	25.2 (1537)
Six Mile Bay	28.4 (271)	28.1 (462)	23.6 (504)
Finlay Bay	33.2 (316)	26.4 (277)	32.8 (409)
Elizabeth Creek	76.2 (449)	64.4 (616)	61.8 (455)
Dunlevy <sup>1</sup>	34.0 (580)	--	38.2 (1046)
Mackenzie Landing	23.4 (788)	28.5 (932)	45.0 (685)

<sup>1</sup>Dunlevy was closed for construction through Year 6 (2014) and not monitored

Because all of the cameras operated continuously the number of complete records (in-out events) used to estimate user duration of stay increased further from Year 6 (2014). Site visit duration time in excess of 65 days at Elizabeth Creek suggests that some boat launch users appear to be mooring their vessel within the reservoir for extended periods (Table 4). Non-boaters also left recreational vehicles at some sites occupying camp stalls for extended periods. The number of repeat users suggest recreation site improvements have been received favourably by the public (Table 5).

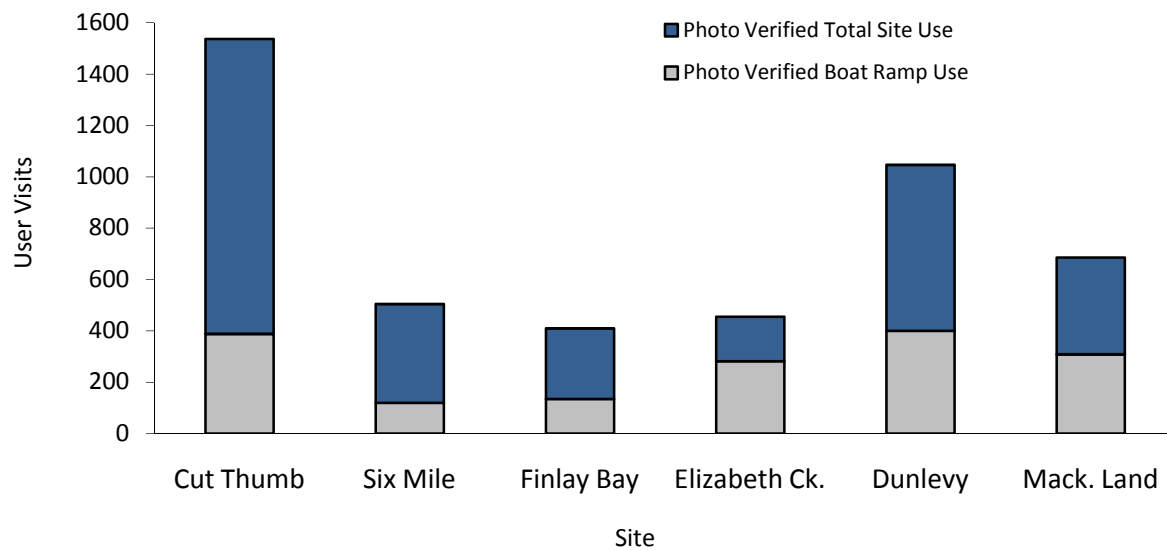


Figure 4. Proportion of users with boats by site verified by photos in Year 7 (2015) between May 14 and October 31.

Table 4. Mean duration of stay (hours) for site users with or without boats in Year 7 (2015).

Site	Boaters			Non-boaters		
	n	mean	range	n	mean	range
Cut Thumb Bay	326	38.3	0.05 – 276.58	769	27.9	0.01 - 337.5
Six Mile Bay	101	42.8	0.07 – 365.9	291	14.8	0.05 – 240.5
Finlay Bay	132	66.0	0.11 – 235.42	211	19.8	0.002 – 214.4
Elizabeth Creek	266	32.9	0.01 – 1584.2	169	0.3	0.001 – 3.5
Dunlevy	315	32.1	0.004 - 450.5	383	1.7	0.004 - 86.1
Mackenzie Landing	292	10.7	0.005 - 190.4	368	0.2	0.001 - 4.2

Table 5. Number of easily recognized repeat visitors per site during the Year 7 (2015) monitoring period, May 14 – October 31.

Site	Repeat visitors
Cut Thumb Bay	359
Six Mile Bay	71
Finlay Bay	50
Elizabeth Creek	142
Dunlevy	166
Mack. Landing	166

### *Effects of reservoir elevation on boat launch use*

Reservoir elevation was higher than the 10-year average throughout the Year 7 (2015) monitoring period (Figure 5). This is attributed to less winter drawdown leaving higher reservoir elevation in the spring of 2015. There are now 2 concrete boat ramps designed to provide early season, low elevation access to the Peace Reach of the Williston Reservoir. Although the toe of the newly constructed boat ramp at Dunlevy reaches to 660.5 masl., well below the reservoir elevation at the start of the monitoring period, boater use was highest at Elizabeth Creek in May with 90 visits. Nonetheless, boater use in May and June at Dunlevy was markedly higher compared to Year 5 (2013), presumably due to site reconstruction. At Dunlevy, six boater visits were recorded in May 2013 with 44 boater visits during the same interval in 2015.

Boater visits shifted in June 2015 with Dunlevy hosting 74 users compared to 56 at Elizabeth Creek. The total number of boaters through May and June at Elizabeth Creek and Dunlevy were 146 and 118 respectively. Twenty-eight boaters launched at Mackenzie Landing in May 2015 and 49 launched in June 2015. Mackenzie Landing was still under construction in May 2014 so comparison to 2015 is not possible, but boater use increased from 37 visits in June 2014. Although the low elevation ramp was quickly submerged by fast rising water, several large boats were launched during this time. A sharp increase in boater use at Six Mile Bay around monitoring day 100 (August 21) is the result of completion of recreation site expansion and improvements and a community fishing derby. (Figure 6).

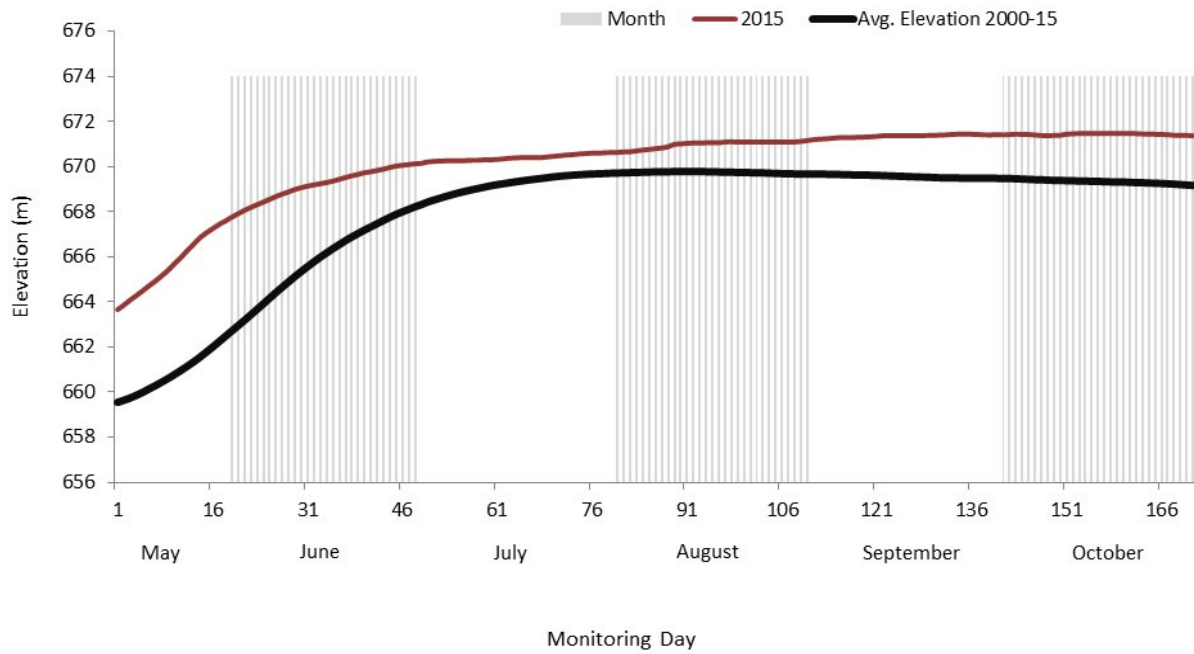


Figure 5. Williston Reservoir daily average elevation during the Year 7 (2015) recreation site monitoring period compared to the mean of daily average reservoir elevation between 2000 and 2015. Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.



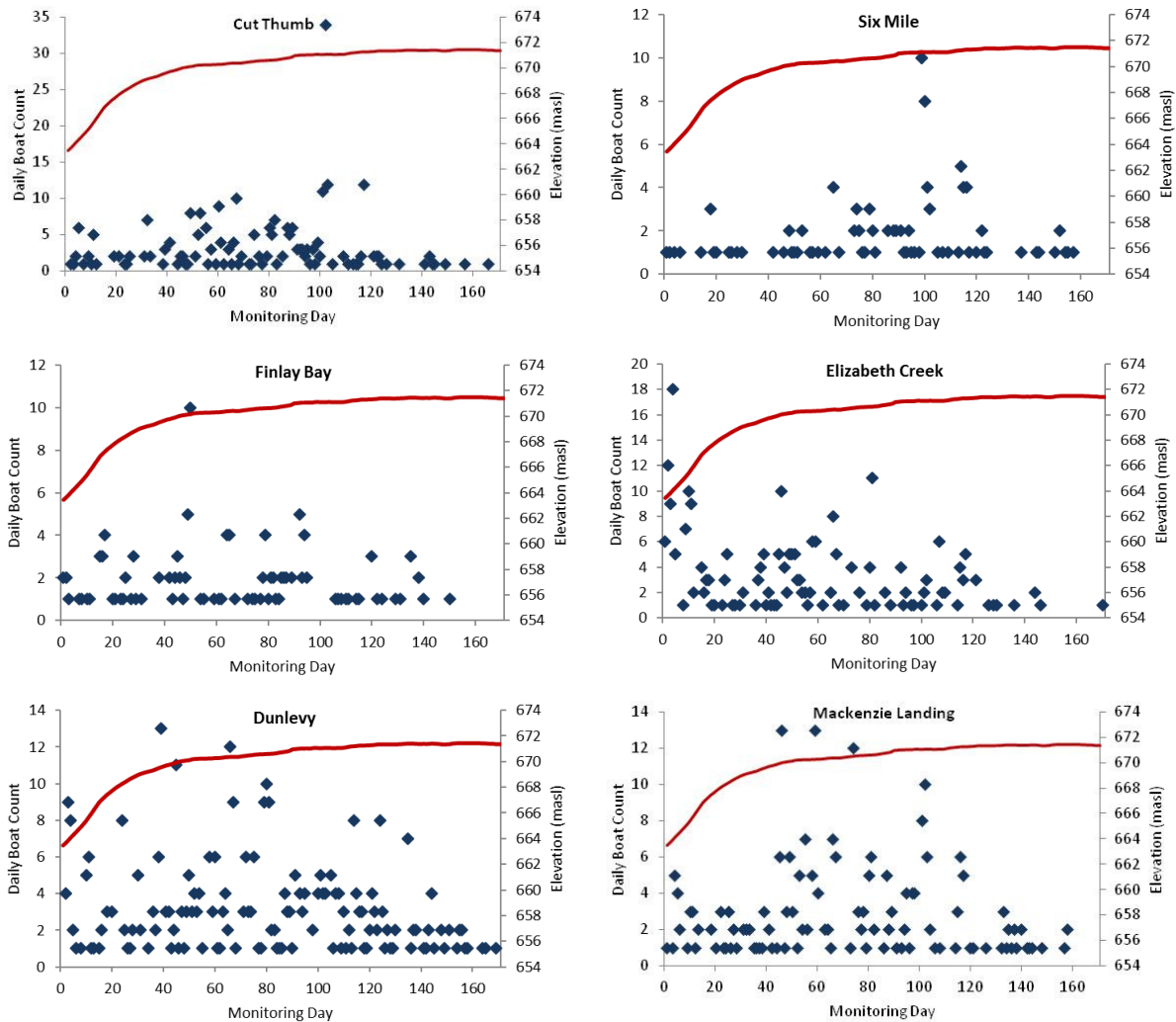


Figure 6. Daily boater use count (points) as a function of monitoring day and reservoir elevation (line) for each recreation site in Year 7 (2015). Data reduced at Six Mile Bay due to construction. Monitoring day 1 corresponds to May 14 while monitoring day 171 corresponds to October 31.

## DISCUSSION

The reconstruction of low reservoir elevation launch facilities at Dunlevy provides a second alternative to Elizabeth Creek for early season access to the Williston Reservoir's Peace Reach for boaters. Most early season visits to Dunlevy and Mackenzie Landing were visitors without boats, perhaps to view the finished boat launch. Once users knew about the improvements to Dunlevy, boater use increased, in part, by some users who were observed previously launching at Elizabeth Creek in May. Now that

potential users are aware of the improvements, early season use is expected to increase in the future. Cut Thumb, Finlay Bay and Elizabeth Creek also offer early season options for those launching larger boats while Six Mile is unsuitable during this time. Wood debris removal, camping site expansion and improvements undertaken in Year 7 (2015) to Six Mile Bay should promote higher mid to late season site use by boaters and multi-day users in future years when higher reservoir elevation eases boat launching.

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## **APPENDIX A. SITE PHOTOS**



Cut Thumb May 7 2015 663 masl



Cut Thumb July 2 2015 670 masl



Cut Thumb July 30 2015 671 masl



Cut Thumb alt. launch July 30 2015 671 masl



Cut Thumb August 18 2015 671 masl



Cut Thumb alt. launch August 23 2015 671 masl



Six Mile Bay alt. camping May 7 2015 663 masl



Six Mile Bay May 7 2015 663 masl



Six Mile Bay July 2 2015 670 masl



Six Mile Bay before site upgrades July 30 2015



Six Mile Bay after upgrades August 18 2015



Six Mile Bay after upgrades August 23 2015



Finlay Bay May 17 2015 664 masl



Finlay Bay May 23 2015 665 masl



Finlay Bay July 2 2015 670 masl



Finlay Bay July 2 2015



Finlay Bay July 30 2015 671 masl



Finlay Bay November 14 2015 671 masl



Elizabeth Creek May 7 2015 663 masl



Elizabeth Creek May 7 2015 663 masl



Elizabeth Creek parking lot May 7 2015



Elizabeth Creek July 3 2015 670 masl



Elizabeth Creek July 31 2015 671 masl



Elizabeth Creek September 9 2015 671 masl



Dunlevy May 15 2015 664 masl



Dunlevy top of ramp May 15 2015



Dunlevy July 3 2015 670 masl



Dunlevy parking lot July 3 2015



Dunlevy July 31 2015 671 masl



Dunlevy November 13 2015 671 masl





Mackenzie Landing May 7 2015 663 masl



Mackenzie Landing May 7 2015 663 masl



Mackenzie Landing July 2 2015 670 masl



Mackenzie Landing August 4 2015 671 masl



Mackenzie Landing August 18 2015 671 masl



Mackenzie Landing November 9 2015 671 masl